CLAIMS

1. A data structure for use in timecode representation comprising:

one or more time measure parameters associated with a media sample and which can be used to specify a nominal time associated with the media sample; and

an offset parameter to specify a difference between the time specified by the one or more time measure parameters and a represented time associated with the media sample.

2. The data structure of claim 1, wherein the one or more time measure parameters are defined in terms of SMPTE timecode parameters.

3. The data structure of claim 1, wherein the one or more time measure parameters comprise a SMPTE NTSC non-drop or drop-frame timecode.

4. The data structure of claim 1, wherein the one or more time measure parameters comprise the following parameters:

hours, minutes, seconds and frames; or equivalently,

seconds and frames.

5. The data structure of claim 1, wherein the one or more time measure parameters comprise the following parameters:

hours, minutes, seconds and fields; or equivalently,

seconds and fields.

6. The data structure of claim 1, wherein the one or more time measure parameters comprise the following parameters:

hours, minutes, seconds, frames, and fields; or equivalently,

seconds, frames, and fields.

7. The data structure of claim 1, wherein the one or more time measure parameters comprise at least a field parameter that is associated with one or more fields comprising a media sample frame.

8. The data structure of claim 1 further comprising a discontinuity parameter configured to specify whether there is a discontinuity at a boundary between a specific media sample and another specific adjacent sample.

9. A data structure for use in timecode representation comprising:

one or more time measure parameters associated with a media sample and which can be used to specify a time associated with the media sample; and

an offset parameter defined by a units-per-second denominator factor to be used to reference the one or more time measure parameters to a represented time.

10. The data structure of claim 9, wherein the offset parameter can be used to reference the one or more time measure parameters to the true time for multiple different sampling rates.

11. The data structure of claim 10, wherein the sampling rates comprise rates selected from a group comprising: 24,000/1001 frames per second, 24 frames per second, 30,000/1001 frames per second, 30 frames per second, 60,000/1001 frames per second, 60 frames per second, and 25 frames per second.

12. The data structure of claim 9, wherein the units-per-second denominator factor can have a general integer value.

13. The data structure of claim 9, wherein the units-per-second denominator factor can have a value of a fixed integer constant divided by a general integer value, in which the integer constant is an integer multiple of 30,000.

14. The data structure of claim 9, wherein the units-per-second denominator factor can have one or more values, at least one of which is an integer multiple of 30,000.

15. The data structure of claim 9, wherein the units-per-second denominator factor can have only one value, said value being an integer multiple of 30,000.

16. The data structure of claim 9 further comprising a frame number parameter which indicates a frame number, and a units-per-frame numerator factor that can have a general integer value.

17. The data structure of claim 9 further comprising a frame number parameter which indicates a frame number, and a units-per-frame numerator factor that can have one or more values, at least one of which is an integer multiple of 1001.

18. The data structure of claim 9 further comprising a field number parameter which indicates a field number, and a fields-per-frame parameter which specifies a number of fields per frame.

19. The data structure of claim 18, wherein the number of fields per frame can have a general integer value.

20. The data structure of claim 18, wherein the number of fields per frame can have one or more values, at least one of which is 2.

21. The data structure of claim 18, wherein the number of fields per frame can have only one value equal to 2.

22. The data structure of claim 18 further comprising a units-per-field numerator factor that can have a general integer value.

23. The data structure of claim 18 further comprising a units-per-field numerator factor that can have one or more values, at least one of which is an integer multiple of 1001.

24. The data structure of claim 9 further comprising a parameter that indicates a timecode increment counting method comprising SMPTE timecode non-drop or drop frame counting.

25. A data structure for use in timecode representation comprising:

one or more time measure parameters associated with a media sample and which can be used to specify a time associated with the media sample; and

an offset parameter defined by a:

units-per-second denominator factor to be used to reference the one or more time measure parameters to a represented time, the units-per-second denominator factor being capable of having one or more values, at least one of which is an integer multiple of 30,000; and

a units-per-frame numerator factor that can have one or more values, at least one of which is an integer multiple of 1001.

26. A data structure for use in timebase representation comprising:

a first parameter associated with a number of basic units of time in the timebase per second;

second parameter associated with basic units of time to be added for each field count increment; and

third parameter associated with a number of fields defined for each frame.

27. The data structure of claim 26 further comprising a fourth parameter associated with a method that can be used to compensate frame counting increments to reduce or eliminate drifts over time between true time and a timecode timestamp.

28. A method of providing a timecode comprising:

providing multiple media samples;

counting the media samples both with respect to media sample frames and fields within media sample frames; and

timecoding the multiple media samples with a timecode comprising:

values associated with media sample frames,

values associated with fields within media sample frames, and

an offset that can be used to ascertain a represented time associated with individual fields within the media sample frames.

29. A method of providing a timecode comprising:

providing a plurality of media samples at a particular frame rate, the media samples having associated timecodes; and

offsetting drift associated with the media samples by using an offset parameter that specifies a difference between a time measure defined by the associated timecodes and a represented time associated with the media samples.

30. The method of claim 29, wherein the frame rate is not an integer frame rate.

31. One or more computer-readable media having computer-readable instructions thereon which, when executed by a computer, cause the computer to:

provide a plurality of media samples at a particular non-integer frame rate, the media samples having associated timecodes; and

offset drift associated with the media samples by using an offset parameter that specifies a difference between a time measure defined by the associated timecodes and a represented time associated with the media samples.

32. A method of processing media samples comprising:

providing one or more media samples individual ones of which have a timecode; and

calculating a represented time associated with one or more of the media samples in accordance with the following equation:

time = *x* + (frame count * UPF + offset)/UPS, *w*here:

x is a measure of time associated with the media sample and ascertained from the media sample's timecode;

"frame count" is a value associated with a frame number of the media sample;

"UPF" comprises a number of basic units of time to be added for each field count increment;

"offset" specifies a difference between the time represented by the timecode associated with the media sample and a represented time; and

"UPS" comprises a number of basic units of time in a timebase per unit of time.

33. The method of claim 32, wherein "*x*" is associated with a number of seconds specified by the number of whole seconds represented in a SMPTE timecode, either as a total number of seconds or as parameters representing hours, minutes, and seconds.

34. The method of claim 32, wherein "offset" is selected as a function of a true frame rate of the media samples.

35. The method of claim 34, wherein the true frame rate comprises a fractional number of frames per unit of time.

36. The method of claim 35, wherein the unit of time comprises seconds.

37. A method of timecoding media samples comprising:

providing one or more media samples having a non-integer frame rate;

timecoding the media samples with a timecode that contains an amount of drift due to the media samples having the non-integer frame rate; and

incorporating, in the timecode, an offset parameter that can be used to calculate a reduced-drift time measure that is more accurate than a time measure taken directly from the timecode.

38. The method of claim 37, wherein said timecoding comprises including a fields parameter that is associated with one or more fields comprising a media sample frame.

39. The method of claim 37, wherein the offset parameter can be used to calculate a drift-eliminated time measure.

40. The method of claim 37 further comprising adjusting the offset parameter for at least some of the media samples.

41. The method of claim 40, wherein said adjusting comprises determining whether a pre-determined condition has occurred and responsive thereto, adjusting the offset parameter.

42. The method of claim 41, wherein said pre-determined condition is associated with a seconds counter rolling over.

43. The method of claim 41, wherein said pre-determined condition is associated with whether any frames are dropped.

44. The method of claim 41, wherein said adjusting comprises incrementing the offset parameter by a defined amount.

45. The method of claim 41, wherein said adjusting comprises decrementing the offset parameter by a defined amount.

46. The method of claim 41, wherein said adjusting comprises incrementing the offset parameter by a defined amount, and then at a different time decrementing the offset parameter by a different defined amount.

47. The method of claim 37, wherein said timecode comprises a SMPTE non-drop counting timecode.

48. The method of claim 37, wherein said timecode comprises a SMPTE drop counting timecode.

49. A method of processing media samples comprising:

receiving multiple media samples that have been timecoded with a timecode that contains an amount of drift due to the media samples having a non-integer frame rate, the timecode also containing an offset parameter that can be used to calculate a reduced-drift time measure that is more accurate than a time measure taken directly from the timecode; and

calculating, using the offset parameter, a time measure that is more accurate than a time measure taken directly from the timecode.

50. The method of claim 49, wherein the timecode comprises SMPTE timecode parameters.

51. A method of processing media samples comprising:

providing multiple media samples at a frame rate in which there are a non-integer number of frames per unit of time associated with a media sample timecode;

providing an offset parameter that is associated with the timecode and which describes a difference between the time represented by a timecode and the represented time; and

using the offset parameter, calculating a represented time associated with one or more of the media samples.

52. The method of claim 51 further comprising adjusting the offset parameter for at least one of the media samples.

53. The method of claim 51 further comprising adjusting the offset parameter for at least one of the media samples in accordance with occurrence of a pre-determined condition

54. A method of processing media samples comprising:

providing multiple media samples;

counting frames associated with the media samples to provide a frame count;

counting fields associated with the media samples to provide a field count;

calculating an offset parameter associated with the media samples and configured for use in calculating a represented time associated with the media samples; and

timestamping one or more of the media samples with a timestamp comprising a frame count, field count, and offset parameter.

55. The method of claim 54, wherein there are two fields per frame for each media sample.

56. The method of claim 54, wherein said timestamping comprises timestamping the media samples with SMPTE timecode parameters.

57. The method of claim 54, wherein said calculating comprises adjusting an offset parameter value at least once.

58. The method of claim 54, wherein said calculating comprises adjusting an offset parameter value at least once and in accordance with one or more dropped frames.

59. The method of claim 54, wherein said calculating comprises adjusting an offset parameter value at least once and in accordance with a seconds counter rolling over.

60. The method of claim 54, wherein the represented time can be calculated in accordance with the following equation:

$t = x + ((\text{field\_counter} + \text{FPF}*\text{frame\_counter})\text{UPField} + \text{offset})/\text{UPS}$,

where,

x is a measure of time associated with a media sample;

"frame_counter" is the frame number associated with a media sample;

"UPField" comprises a number of basic units of time to be added for each field count increment;

"offset" specifies a difference between the time represented by a timecode associated with the media sample and the represented time; and

"UPS" comprises the number of basic units of time in a timebase per unit of time.

61. A method of processing media samples comprising:

receiving multiple media samples individual ones of which have been timestamped with a timestamp comprising a frame count, field count, and offset parameter, the frame count being associated with a frame number that corresponds to a media sample, the field count being associated with a field number that corresponds to a particular frame, and the offset parameter being associated with a represented time associated with a media sample; and

calculating a represented time associated with a media sample using the offset parameter.

62. The method of claim 61, wherein said calculating comprises calculating the represented time in accordance with the following equation:

$t = x +$ ((field_counter + FPF*frame_counter)UPField + offset)/UPS,

where,

x is a measure of time associated with a media sample;

"frame_counter" is the frame number associated with a media sample;

"UPField" comprises a number of basic units of time to be added for each field count increment;

"offset" specifies a difference between the time represented by a timecode associated with the media sample and the represented time; and

"UPS" comprises the number of basic units of time in a timebase per unit of time.

63. A method of processing media samples comprising:

receiving media samples that were sampled using a first format, and broadcast using a second format which constitutes separating fields from frames of the first format, the media samples comprising individual frames each with multiple fields, the media samples further comprising a timecode value associated with each individual field, the timecode comprising an offset parameter that specifies a difference between the time represented by a timecode value associated with the media sample and the represented time; and

with the media samples in the second format, calculating a represented time associated with one or more of the fields in the first format.

64. A counting compensation method comprising:

determining a time value associated with a frame count increment for a media sample;

computing accumulated drift between a timecode associated with multiple media samples and true time; and

occasionally skipping a maximum frame number, while counting frames, to reduce the accumulated drift.

65. A counting compensation method as in claim 64, in which the maximum frame number is skipped when the accumulated drift exceeds the time represented by a frame count increment.

66. A counting compensation method comprising:

determining a time value associated with a frame count increment for a media sample;

computing accumulated drift between a timecode associated with multiple media samples and true time; and

occasionally skipping a minimum frame number, while counting frames, to reduce the accumulated drift.

67. A counting compensation method as in claim 66, in which the minimum frame number is skipped when the accumulated drift exceeds the time represented by the frame count increment.